Spring 2008

DroughtScape- Spring 2008

Kelly Smith

National Drought Mitigation Center

DroughtScape

The Newsletter of the National Drought Mitigation Center

Spring 2008

San Angelo, April 24

You are invited to a Drought Planning Tools Workshop, April 24, in San Angelo, TX, presented by the NDMC and the Texas AgriLife Center of Texas A&M. For more information please call 325-653-4576 or read more on page 13.

AgriLIFE RESEARCH & EXTENSION
Texas A&M System

NIDIS Wants You!

A workshop June 17-19 in Kansas City, MO, will bring together producers and users of drought information. Read more on page 12.

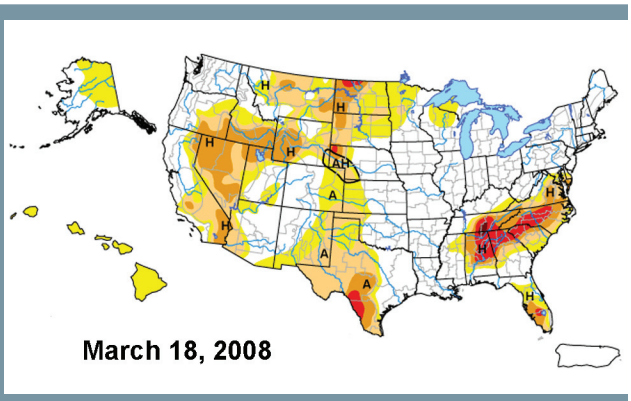
NIDIS
NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

About DroughtScape

DroughtScape is the quarterly newsletter of the National Drought Mitigation Center (NDMC). The NDMC's mission is to reduce vulnerability to drought, nationally and internationally. Please email the editor with ideas: droughtscape@unl.edu

Winter Sees Little Change in U.S. Drought

With La Niña influences to be in place through early summer, conditions may lead to expansion and intensification of drought over west Texas, New Mexico, and Southern Florida. Improvements are possible in the West and Mid-Atlantic regions.



read more on page 2

News Stories Reveal Array of Mitigation Strategies

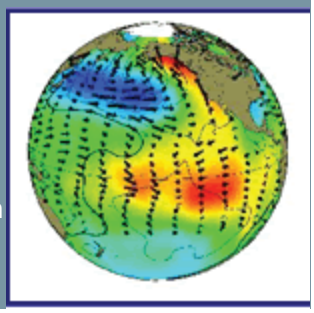
A survey of mitigation strategies from archived news articles reveals that:

- Xeriscaping, using native plants that require less water than lawns, is becoming more widely accepted.
- Municipal water suppliers are adding infrastructure to try to increase supply.
- Low-interest loans from the Small Business Administration are widely available to drought-affected businesses.

read more on page 4

Sea Surface Temperatures Can Help Predict Drought

Guest author Vikram M. Mehta from The Center for Research on the Changing Earth System looks at how drought may be related to ocean patterns such as the Tropical Atlantic Gradient, or TAG, and the Pacific Decadal Oscillation, or PDO, even in areas such as central North America.



read more on page 8

Recent Travels

Images from our workshops in Eastern Montana are on page 10, and images from a presentation in Western Nebraska are on page 11. At right, a granary in Eastern Montana.

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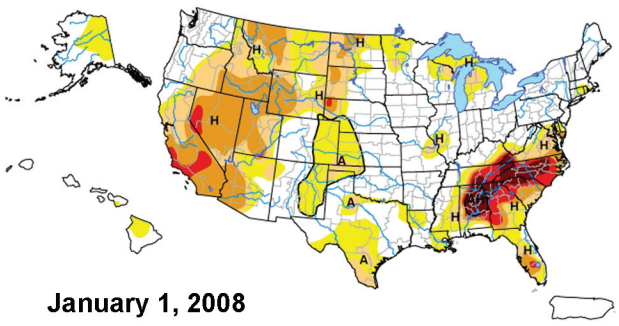
Spring 2008 U.S. Drought Outlook and January to March Summary

By Brian Fuchs, Climatologist, National Drought Mitigation Center

Drought classifications are based on the U.S. Drought Monitor. For a detailed explanation, please visit **http://drought.unl.edu/dm/classify.htm**. *The outlook integrates existing conditions with forecasts from the National Oceanic and Atmospheric Administration's Climate Prediction Center:* **http://www.cpc.ncep.noaa.gov/**

Outlook: La Niña conditions are expected to continue well into early summer, affecting weather patterns throughout the United States. Temperatures should be warmer than normal over the southern half of the country, with the warmest temperatures from New Mexico and Texas along the Gulf Coast. Precipitation should follow the typical La Niña pattern: dryness over much of the southern half of the United States, with the driest conditions expected over the Southeast and Arizona. Drought will probably continue to develop over west Texas and New Mexico as well as south Florida. Some improvements will be possible over the West and Mid-Atlantic.


January 1, 2008

January: Drought status for the United States worsened during the month. January started with 54.6 percent of the country categorized as abnormally dry or in drought and ended with 56.4 percent abnormally dry or in drought. Much of the expansion was in the southern Plains in Texas and Oklahoma. January was a warm month over much of New England and into the Midwest. Temperatures were 4 to 6 degrees Fahrenheit above normal for the month, with the warmest temperatures recorded in New York. Temperatures were below normal for much of the Southeast and West, ranging from 6 to 10 degrees Fahrenheit below normal for the month. Dry conditions continued to hamper the Plains, where much of west Texas, western Nebraska, North Dakota and Minnesota were extremely dry for the month. The Sierra Nevada, San Juan, and Rocky Mountains saw plenty of snowfall and were well above normal for the month.

February: Drought conditions improved across the United States during the month of February. Drought eased up over much of the West and Southeast, while conditions in Texas worsened. February started with 56 percent of the United States classified as abnormally dry or in drought compared to just 50 percent at the end of the month. Precipitation was well above normal for much of the Midwest, Great Lakes, and New England regions. Good snowfall continued across the mountains of the West while the Southeast received some relief from Mississippi through Georgia and Florida. Temperatures were 6 to 10 degrees Fahrenheit below normal in the Midwest and into the mountainous West. Temperatures were well above normal in the southern Plains, along the Gulf Coast and up into the Mid-Atlantic regions.

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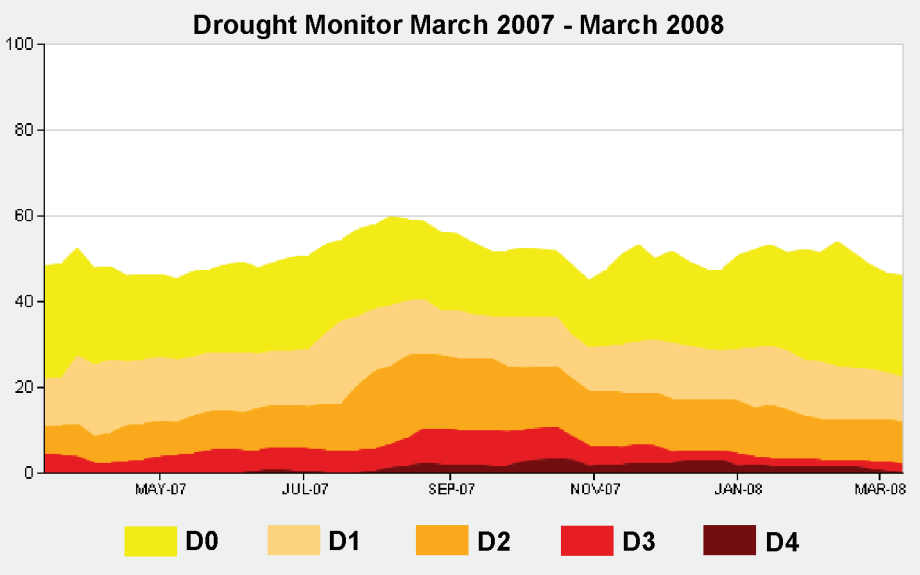
January to March Summary, continued

March: Drought improved across the United States during the first few weeks of March. When March started, 50 percent of the country was classified as abnormally dry or in drought compared to 46.7 percent as of March 17, 2008. Improvements over the Southeast continue, as a wetter pattern has brought relief over the short-term, but long-term hydrological problems still exist. Temperatures for March have started off cool, with much of the United States recording below-normal temperatures. March has been wet up to this point over much of east Texas through the Midwest and up into New England as well as Florida. Dry conditions over much of the West have not allowed any improvements.



This figure shows the proportion of the United States in each category of drought for the year that ended in mid-March, 2008.

Contact the National Drought Mitigation Center

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Drought Mitigation, As Reported by Media

By Melissa J. Melvin, Graduate Student, National Drought Mitigation Center

Interest in drought mitigation has been growing in recent years as research and experience suggests that hazard mitigation saves money and livelihoods. Also, with improved drought monitoring and awareness and the prospect of an uncertain future climate, decision makers at all levels — homeowners, farmers and ranchers, resource managers, policy makers — are undertaking drought planning and mitigation.

Information about drought mitigation actions currently being used is available through a number of sources, and one source rich with such information is the media. Here are some highlights from a collection of mitigation stories archived by historian Deborah A. Wood at the NDMC (http://www.drought.unl.edu/mitigate/news.htm) from 2004 through 2007. The categories used in this listing and the expanded descriptions of key items are consistent with how we'll present drought impacts and mitigation strategies in the new Drought Impact Reporter and the new NDMC website, both of which should be online this summer.

Mitigation, Defined

Different groups use the word *mitigation* in slightly different ways.

According to the Federal Emergency Management Agency (FEMA), "Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. This is achieved through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk … ."
(http://www.fema.gov/government/mitigation.shtm)

FEMA's definition of *mitigation* is what we at the National Drought Mitigation Center mean by *mitigation*, although drought is not one of the disasters that FEMA handles.

In contrast, the Intergovernmental Panel on Climate Change (IPCC) uses *adaptation* to describe actions taken to reduce impacts. To the IPCC, *mitigation* means reducing the extent of global warming.

In environmental engineering, *mitigation* may refer to planned activities that offset the environmental effects of a project.

None of these definitions is right or wrong, but it's helpful to clarify which one we are using and to be consistent.

Agriculture

- Planting crop varieties with increased tolerance for water stress, use of no-till farming to improve soil moisture content, use of more efficient irrigation systems (such as subsurface drip irrigation) to conserve water supplies. "Farming innovations help stretch stressed resource," *Omaha World-Herald*, July 22, 2007. "No-Till and Poultry Litter Can Help Cotton Weather Drought," Jan. 5, 2006, USDA Agricultural Research Service. "Researchers engineer drought-resistant plants," Nov. 26, 2007, *Nature*. "Drought tolerance can conserve water, energy," Nov. 13, 2007, *Farm Press*. "Researchers Discuss No-Till Practices," *Prairie Star*, Great Falls, Montana, Sept. 14, 2005.
- Installation of bio-remediation systems on the farm to recycle waste water and increase water availability. "An Oahu Farm Uses Science to Combat Drought Conditions," KHNL News 8, Honolulu, July 26, 2007.
- Develop range management software to determine appropriate carrying capacity during drought. "Helping Ranchers Calculate the Future," *Bismarck Tribune*, June 3, 2007.

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Water Supply and Quality

- Develop and enforce water use restrictions and/or water rationing. "Lubbock City Council Moves Forward with Drought Contingency Plans," KCBD, NewsChannel 11, June 26, 2006. "Bladen Drought Worsens, Water Rationing in Elizabethtown," *Bladen* (N.C.) *Journal*, June 5, 2007.
- Build desalinization plants and/or water treatment plants to increase water supplies. "Desalination Plant Delivering Clean Drinking Water to Tampa Bay Region," *Water Online*, Jan. 25, 2008.
- Link water systems to neighboring systems with more diversified water supplies. "Council OKs $3M Water Connection," *The Herald-Sun*, Durham, N.C., Jan. 8, 2008.
- Develop water supply and drought preparedness plan in advance of a drought. "[San Diego] CWA to prepare drought management plan," *Fallbrook* (Calif.) *Village News*, March 9, 2006.
- Install additional water intake pipes in lakes and rivers and expand treatment capacity to improve reliability of community water supply. "County plans second water intake," *Clayton* (N.C.) *News-Star*, Jan. 2, 2008.

Plants and Wildlife

- Aerate ponds to increase the oxygen content. "Drought impacts Mississippi pond water, oxygen levels," MSU Ag Communications, Aug. 29, 2006.
- Plant native, less water intensive lawns and gardens (Xeriscaping). "In Florida, lukewarm welcome for drought-resistant landscaping," *Christian Science Monitor*, Aug. 17, 2007. "Texas drought study focuses on turfgrass survival, recuperation," *Landscape Management*, April 9, 2007.
- Use rain barrels to collect and store storm water for later lawn/plant irrigation. "'Old technology' to provide help in ongoing drought," *Hickory* (N.C.) *Daily Record*, Nov. 19, 2007.
- Implement city ordinances for lawn care and landscaping. "Drought Ordinance Will Reduce Use of Certain Grasses," WOAI, San Antonio, Jan. 11, 2007.

Development of range management software to determine appropriate carrying capacity during drought

A rangeland management specialist with the Natural Resources Conservation Service (NRCS) has developed "The Drought Management Calculator," a tool designed to help farmers and ranchers determine optimal herd sizes and feed needs. The program uses weather data and historical livestock data to calculate land carrying capacity and other variables. During a drought the program will make suggestions about the number of livestock that should be sold and it can calculate the cost of feeding specific herd sizes. The program also considers real-time market prices to help producers manage their finances and minimize financial losses. This tool is available to farmers and ranchers at no cost from the NRCS. "Helping Ranchers Calculate the Future," *Bismarck Tribune*, June 3, 2007.

Build desalination and/or water treatment plants to increase supplies

In the Tampa Bay area, over 2.5 million residents are now receiving water from the Tampa Bay Seawater Desalination Plant, the country's first large-scale desalination plant. About ten years ago, the Tampa Bay area was affected by a drought that put extreme pressure on local water supplies. Water managers began exploring ways to reduce the vulnerability of their water supply, and when the cost of desalination declined the managers took action. The plant is capable of producing up to 25 million gallons of drinking water per day, and capacity can be expanded to a maximum of 35 million gallons per day. The plant uses several treatment techniques, including reverse osmosis, to separate freshwater from saltwater, and post-treatment dilution ensures that salinity levels in the surrounding environment are not affected. "Desalination Plant Delivering Clean Drinking Water to Tampa Bay Region," *Water Online*, Jan. 25, 2008.

Drought Mitigation, As Reported by Media, continued

Fire

- Increase funding and equipment for fighting wildfires. "$2 million set aside for fighting wildfires," *Rocky Mountain News*, April 20, 2006.
- Develop and enact bans on outdoor burning or use of fireworks. "Drought Prompts Fire Fear," Rapid City (S.D.) Journal, June 23, 2006. "N.C. Drought Conditions Worsen, State Under Burning Ban," WWAY NewsChannel 3, Oct. 15, 2007.
- Implement a wildfire reporting hotline to help stop illegal burning. "Wildfire hotlines help as drought persists," *The Gazette-Enterprise*, Seguin, Texas, Jan. 24, 2006.
- Remove dead vegetation around homes and other structures. "Plant aggravates fire dangers in desert," *Tucson Citizen*, Feb. 8, 2006.

Society and Public Health

- Offer free mental health hot lines for drought affected farmers and ranchers. "Counseling Hotlines Help Farmers Cope with Drought," Associated Press, Nov. 23, 2007.
- Reduce likeliness of home foundation damage by properly watering around the foundation. "Drought Hurting Foundations," Dallas Morning News, Aug. 24, 2006. "Soaker Hoses Can Save Thousands During Drought," KXAS Dallas, Jan. 12, 2006.
- Planning for future water needs and drought conditions during the building of new housing developments. "Drought Tolerant Concept Embraced by Developers," *Victor Valley* (Calif.) *Daily Press*, April 6, 2005.
- Education/outreach to increase drought awareness and promote drought mitigation activities. "Efforts to inform residents of drought plan," *The Verde* (Ariz.) *Independent*, Feb. 3, 2007.

Planning for future water needs and drought conditions in building new housing developments

In Wendell, North Carolina, ongoing drought conditions have influenced one housing developer to plan for future water needs and drought conditions. The latest development site, Wendell Falls, will serve as the primary connection point linking the water supply in eastern Wake County to a reservoir currently under construction. This will increase water supplies for Wendell and reduce water demand on nearby Raleigh. Additionally, Wendell Falls is constructing separate wells for outdoor irrigation to reduce stress on municipal drinking water, and all grasses planted within the community are required to be native varieties that require less water. Developers are also taking steps to reduce water use in the home by installing the latest green technology and water saving devices.
"New Neighborhood Factors Drought Planning Into Development," *Carolina Newswire.com*, Jan. 24, 2008

Develop water supply and drought preparedness plan in advance of a drought

Officials in the El Dorado Irrigation District have adopted a drought preparedness plan that describes actions to be taken at various levels of drought severity. The plan, which has been in development for several years, specifies three stages of drought severity along with guidelines for water use reductions at the different stages. For example, Stage 1 calls for increased public awareness about water shortages and encourages a 15% reduction in water use. Stage 2 mandates a 30% reduction in water use, and Stage 3 mandates a 50% reduction. The plan also clearly defines the types of water uses that are allowed at different stages, and it identifies consequences (fines) for violating water use restrictions.
"In Wet Year, EDID Prepares for Drought Down the Road," *The Sacramento Bee*, Feb. 12, 2008.

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Tourism and Recreation

- Development of seed and water management plans for golf courses. "Western golf courses face challenge of staying green," *US Water News Online*, March 2005.
- Golf courses planting drought-tolerant native grass cultivars to reduce water use. "Colorado golf courses getting creative with water conservation," *Colorado Springs Business Journal*, June 11, 2004.
- Use of reclaimed water for snow generation at ski resorts. "Snowmaking plan pits ski area against tribes, environmentalists," *US Water News Online*, March 2005.

Energy

- Implement 'Demand Exchange Program' to provide financial incentives for customers who reduce energy use during peak hours, reducing stress on hydroelectric plants and encourage energy conservation all year. "Drought will push electric bills higher," April 1, 2005, *Capital Press Agriculture Weekly*, Salem, Ore.

Business and Industry

- City ordinance requiring car washes to operate using recycled water. "Could Car Washes Be the Answer to Water Conservation?" *Fayetteville* (N.C.) *News*, Sept. 3, 2007.
- Offer loans for small business affected by drought. "SBA Approves Over $1 Million for Drought Victims in Georgia," PR Newswire, Dec. 3, 2007.

Government Relief and Response

- Funding conservation programs (CRP, EQIP, etc.) that help agricultural producers improve sustainability and reduce drought impacts. "Johanns Focuses USDA Programs to Aid Drought Regions," USDA Office of Communications, Aug. 29, 2006.
- USDA and SBA loans/grants to help maintain economic welfare during drought. "USDA Designates 60 Mississippi Counties as Primary Natural Disaster Areas," Farm Service Agency Public Affairs, Oct. 16, 2007.

Drought Monitoring and Assessment

- Funding to develop and implement a drought early warning system (NIDIS). "Senate Commerce Committee Approves Drought Information Bill," U.S. Senate Commerce, Science and Transportation Committee, Sept. 26, 2006.

  Establish statewide drought impact reporting system. "Graham/Greenlee drought impact group part of state initiative," *Eastern Arizona Courier*, March 1, 2007.

Drought Contingency Planning

- Develop drought management plan (occurred at city, county, and state levels).

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Introduction to Major Decadal Climate Variability Phenomena, Part I: The Tropical Atlantic Gradient Variability and the Pacific Decadal Oscillation

by Vikram M. Mehta, The Center for Research on the Changing Earth System, Columbia, Maryland, vikram@crces.org

Following the general background on decadal climate variability (DCV) in the Autumn 2007 issue of *DroughtScape*, we now look at some major DCV phenomena, hypothesized causes, and known impacts on global climate and society. In this issue, two DCV phenomena are described: the tropical Atlantic sea-surface temperature gradient variability (TAG hereafter for brevity) and the Pacific Decadal Oscillation (PDO).

Research on the TAG dates back to the 1960s, when researchers first found associations between variations in the TAG pattern and rainfall variability in northeast Brazil and west Africa. Since then, as more and better ocean and atmosphere observations have become available, it has been found that variability of many atmosphere and ocean variables are associated with the sea-surface temperature (SST) variability shown in Figures 1a and 1b, such as winds in the lower troposphere, heat transferred between the Atlantic Ocean and the overlying atmosphere, cloudiness, rainfall in northeast Brazil and west Africa, Atlantic hurricanes, and water vapor influx and rainfall in the southern, central, and midwestern U.S.

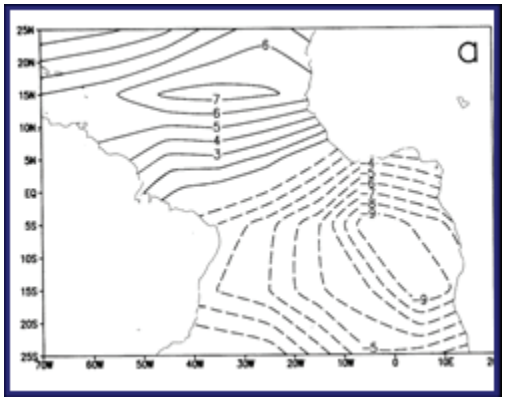

Figure 1a: The dominant pattern of tropical-subtropical Atlantic sea-surface temperature (SST) variability between 1881 and 1990 shows positive (solid line) and negative (dashed line) SST anomalies in the North and South Atlantic, with maximum variability at 15ºN and 15ºS.

Sir Gilbert Walker of the India Meteorological Department first discovered a phenomenon he termed the North Pacific Oscillation (NPO) in the late 1920s. Sir Gilbert wanted to find precursor signals to predict the Indian monsoon rainfall and the NPO was an atmospheric pressure seesaw he found during his studies using worldwide atmospheric pressure measurements. Subsequently, when long-term SST data in the Pacific Ocean became available in the 1990s, a number of researchers found that the dominant pattern of SST variability in the extratropical Pacific varied at time scales of one or more decades and that this SST pattern corresponded to the NPO in the atmosphere. This SST pattern, shown in Figure 2a, is called the PDO and the time series modulating this SST pattern is shown in Figure 2b.

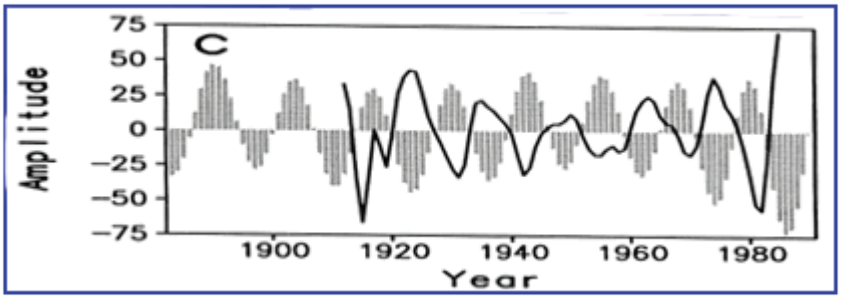

Figure 1b: The 110-year-long SST time series (bars) modulating this pattern shows decadal-to-multidecadal variability. Rainfall in northeast Brazil (solid line) shows opposite phase variability with respect to the SST time series.

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TAG and PDO, continued

Among the phenomena associated with the PDO are winds in the lower troposphere, heat transferred between the Pacific Ocean and the overlying atmosphere, cloudiness, Pacific typhoons, and droughts and floods in the western U.S. and the Missouri River Basin. Major changes in northeast Pacific marine ecosystems have been correlated with phase changes in the PDO; warm eras have seen enhanced coastal ocean biological productivity in Alaska and inhibited productivity off the west coast of the contiguous United States, while cold PDO eras have seen the opposite north-south pattern of marine ecosystem productivity.

Scientists hypothesize that the principal cause of the TAG and the PDO is the variability of heat transported by currents and slow-moving waves in the Atlantic and Pacific Oceans, as a result of their interactions with the atmosphere. Both these phenomena are associated with decadal droughts, floods, and associated variability of crop yields in the Missouri River Basin.

Q: What is the Tropical Atlantic Gradient Variability (TAG)?

A: It is the year-to-year and longer-term variability of the cross-equatorial sea-surface temperature (SST) gradient (or difference) in the tropical Atlantic Ocean.

Q: What is the Pacific Decadal Oscillation (PDO)?

A: The Pacific Decadal Oscillation is characterized by year-to-year and longer-term, predominantly decadal-to-multidecadal, variability of the Pacific Ocean SSTs, with opposite phases in the tropical-subtropical Pacific Ocean and the mid-latitude Pacific Ocean.

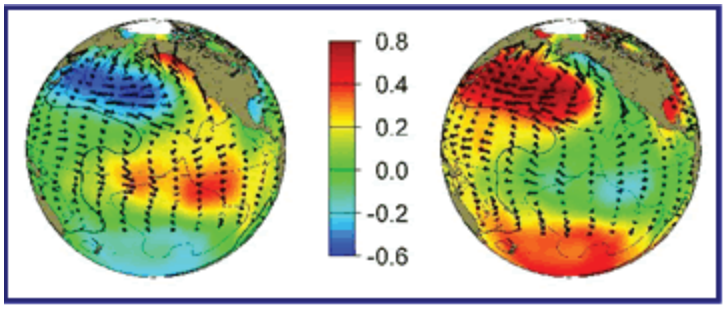

Figure 2a: SST departures from average conditions in the PDO in the positive phase (left) and the negative phase (right). Courtesy Nathan Mantua and Stephen Hare, University of Washington.

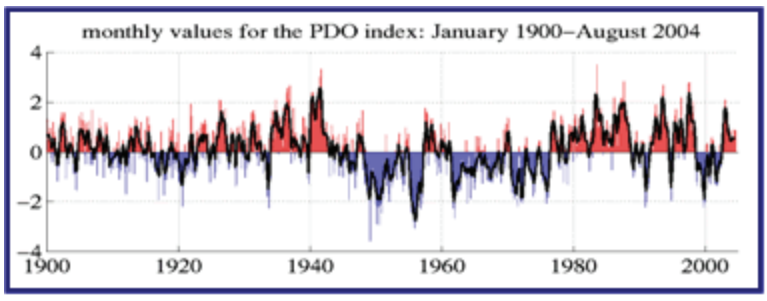

Figure 2b: Time series of SST monthly departures associated with the PDO. Courtesy Nathan Mantua and Stephen Hare, University of Washington.

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NDMC Highlights VegDRI, VegOut and Risk Management in Montana

NDMC Photo

Workshop hosts at Fort Peck Community College in Montana on March 12 were Ember RunsThrough, left, Lance Four Star, right, and Lance's wife Jolene Four Star, center. Lance is president of the Student Senate, which catered the event as a fund-raiser, providing two six-foot sub sandwiches and an array of other food.

For more information about our presentations at:

- **Fort Peck Community College in Wolf Point, MT, on March 12, focusing on VegDRI and VegOut, and**
- **Miles City, MT, on March 13, focusing on "Risk Management Beyond the Boundaries,"**

please visit What's New on our website: http://drought.unl.edu/new.htm.

NDMC Photo

The Missouri River forms the southern border of the Fort Peck Indian Reservation, where NDMC representatives conducted a workshop on VegDRI and other drought decision-making tools.

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NDMC Helps With Republican River Basin Info System

Cody Knutson, Donna Woudenberg, Jae Ryu, Mark Svoboda, and Sandra Jones attended the Southwest Nebraska Water Conference on March 5 in McCook, Nebraska, to present their project, "Development of a Web-Based Climate and Drought Information Clearinghouse for the Republican River Basin." Participants saw and reacted to samples of what the portal might look like, such as the image above. Below, participants used hand-held "clickers" during parts of the presentation to transmit their preferences about what they were seeing.

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NIDIS to Seek User Input at KC Workshop in June

Workshop on Status of Drought Early Warning Systems in the U.S. June 17-19, 2008, Kansas City, MO

You are invited!

Please register ASAP to ensure that you can participate, as space will be limited. To register, please go to the workshop link:

http://snr.unl.edu/ndmcsurvey/nidisregistrationkc2008.html

This workshop will bring together drought planners from watersheds, agriculture, energy, municipal water suppliers, and other sectors. Speakers and attendees will include providers, brokers, and users of drought information across a variety of climatic timescales.

Location:
National Weather Service Training Center
7220 N.W. 101st Terrace
Kansas City, Missouri

Detailed driving instructions:
http://www.nwstc.noaa.gov/d.admin/t_map.html

Hotel information:
Room blocks available Monday, June 16 through Thursday, June 19
Homewood Suites, 40 rooms
Embassy Suites, 35 rooms
Residence Inn, 50 rooms
$103 for a government rate single room, $20 extra for a guest
Please reserve your room by May 26.

Questions? Please contact Kelly Smith, ksmith2@unl.edu, 402-472-3373.
For more information on NIDIS, please visit http://drought.gov

You Are Invited
to a Drought Planning Tools Workshop
Thursday, April 24, 2008
8:30 a.m.- 4:45 p.m.
Texas AgriLife Research & Extension Center
7887 U.S. Hwy. 87 N., San Angelo, Texas 76901

a joint production of the National Drought Mitigation Center and the Texas AgriLife Research & Extension Center, with sponsorship from the USDA's Risk Management Agency

Morning topics include:

- Drought Update: Climate Services and Monitoring Tools Available from National Weather Service, San Angelo.
- Drought Impact Reporter: Putting a Face on Drought.
- Developing a Vegetation Drought Response Index: Monitoring Vegetation Stress from a Local to National Scale.
- Grazing Management after Fire and Drought.

Drought tools:

- help with management decisions.
- have some experimental predictive capability.
- help communicate with claims adjusters and policy makers.
- help track market conditions.

Afternoon topics include:

- GreenLeaf: Taking a Google Approach to Agricultural Decision Support.
- Managing Risk on the Ranch: A Guide to Help Better Prepare for and Respond to Drought.
- Building a New Drought Monitor/Decision Support System: Putting it All Together.
- Drought Frequency in Central and West Texas: Past vs. Future.
- Rangeland/Pasture Drought Insurance Program Update.
- U.S. Department of Agriculture Programs Available for Ranching Losses.

Individual registration, including lunch, is $10 by April 18 and $25 thereafter.

To register or for more information, please call 325-653-4576.

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